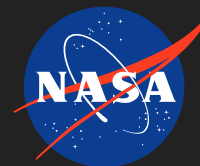


# A Compact Fluorescence Lifetime Excitation-Emission Spectrometer (FLEXEMS) for Detecting Trace Organics, Phase I

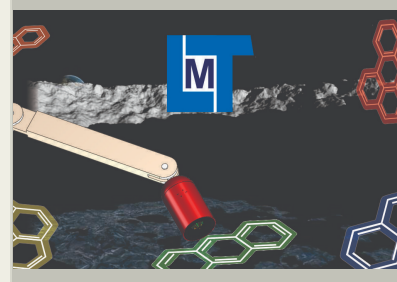
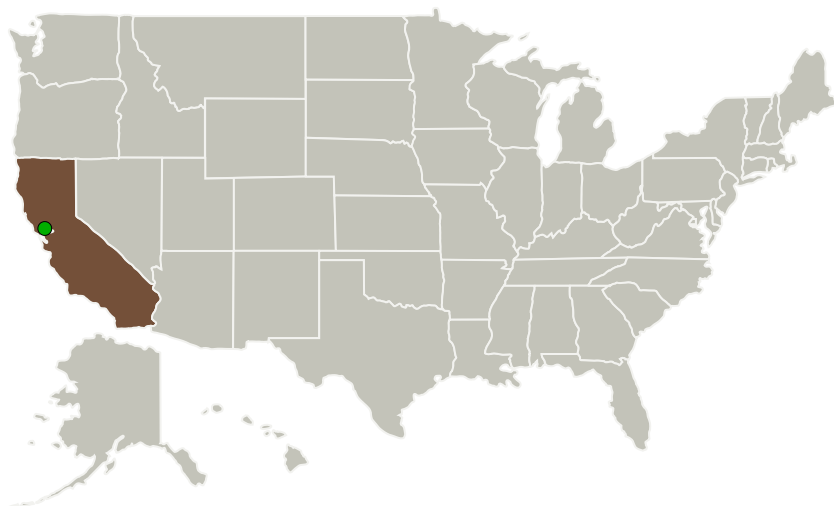
Completed Technology Project (2016 - 2016)



## Project Introduction

In this Small Business Innovative Research (SBIR) effort, Leiden Measurement Technology (LMT) proposes to design and build the Fluorescence Lifetime Excitation Emission Spectrometer (FLEXEMS), a stand-off fluorescence spectrometer that uses multiple light-emitting diodes to excite fluorescence in samples from the deep-ultraviolet through the visible and employs time-correlated single-photon counting (TCSPC) and steady-state photon-counting techniques to quantify the fluorescence properties of the target in order to detect and identify trace levels of organics in-situ. The addition of fluorescence lifetime measurements distinguishes it from other compact, field-portable instruments available. The instrument will require no reagents or consumables and by simply placing the instrument on a sample of rock, soil, or ice, or other material it will be able to detect a wide range of organics (at or below the 10-100 ppb-level) including free aromatic amino acids; biomarkers including F420 (specific to methanogens), NADH, and proteins; PAHs; and porphyrins (e.g. chlorophyll). It will be designed with flight in mind so that mass, volume, and power-usage will be minimized as much as possible. The use of multi-anode photomultiplier tubes (PMTs) and/or avalanche photodiodes (APDs) will make the system compact and rugged and thus suitable for future missions and ongoing field and laboratory studies.

## Primary U.S. Work Locations and Key Partners



A Compact Fluorescence Lifetime Excitation-Emission Spectrometer (FLEXEMS) for Detecting Trace Organics, Phase I

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

# A Compact Fluorescence Lifetime Excitation-Emission Spectrometer (FLEXEMS) for Detecting Trace Organics, Phase I

Completed Technology Project (2016 - 2016)



Organizations Performing Work	Role	Type	Location
Leiden Measurement Technology, LLC	Lead Organization	Industry	Sunnyvale, California
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

## Primary U.S. Work Locations

California

## Project Transitions

**June 2016:** Project Start

**December 2016:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137808>)

## Images



### Briefing Chart Image

A Compact Fluorescence Lifetime Excitation-Emission Spectrometer (FLEXEMS) for Detecting Trace Organics, Phase I  
(<https://techport.nasa.gov/image/137007>)



### Final Summary Chart Image

A Compact Fluorescence Lifetime Excitation-Emission Spectrometer (FLEXEMS) for Detecting Trace Organics, Phase I Project Image  
(<https://techport.nasa.gov/image/133206>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Leiden Measurement Technology, LLC

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

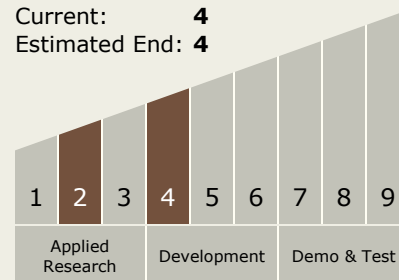
Carlos Torrez

### Principal Investigator:

Nathan E Bramall

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



# A Compact Fluorescence Lifetime Excitation-Emission Spectrometer (FLEXEMS) for Detecting Trace Organics, Phase I

Completed Technology Project (2016 - 2016)



## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.3 Optical Components

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System